How to Calculate the P-Value of a Z-Score in R?

Authored by

stats writer

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The p-value of a z-score is a measure of the probability of obtaining a certain z-score or lower (if the z-score is positive) or higher (if the z-score is negative) if the null hypothesis is true. To calculate the p-value of a z-score in R, you can use the pnorm function which takes the z-score as an argument and returns the two-tailed p-value. This p-value should then be compared to the alpha level to determine whether the null hypothesis should be accepted or rejected.

Often in statistics we're interested in determining the p-value associated with a certain z-score that results from a . If this p-value is below some significance level, we can reject the null hypothesis of our hypothesis test.

To find the p-value associated with a z-score in R, we can use the pnorm() function, which uses the following syntax:

pnorm(q, mean = 0, sd = 1, lower.tail = TRUE)

where:

q: The z-score
mean: The mean of the normal distribution. Default is 0.
sd: The standard deviation of the normal distribution. Default is 1.
lower.tail: If TRUE, the probability to the left of **q** in the normal distribution is returned. If FALSE, the probability to the right is returned. Default is TRUE.

The following examples illustrate how to find the p-value associated with a z-score for a left-tailed test, right-tailed test, and a two-tailed test.

Left-tailed test

Suppose we want to find the p-value associated with a z-score of **-0.77** in a left-tailed hypothesis test.

#find p-value
pnorm(q=-0.77, lower.tail=TRUE)

0.2206499

The p-value is **0.2206**. If we use a significance level of $\alpha = 0.05$, we would fail to reject the null hypothesis of our hypothesis test because this p-value is not less than 0.05.

Right-tailed test

Suppose we want to find the p-value associated with a z-score of **1.87** in a right-tailed hypothesis test.

#find p-value
pnorm(q=1.87, lower.tail=FALSE)

0.03074191

The p-value is **0.0307**. If we use a significance level of α = 0.05, we would reject the null hypothesis of our hypothesis test because this p-value is less than 0.05.

Two-tailed test

Suppose we want to find the p-value associated with a z-score of **1.24** in a two-tailed hypothesis test.

#find p-value for two-tailed test
2*pnorm(q=1.24, lower.tail=FALSE)

0.2149754

The p-value is **0.2149**. If we use a significance level of α = 0.05, we would fail to reject the null hypothesis of our hypothesis test because this p-value is not less than 0.05.

You can also use this online to find p-values.